REMARKS

Applicant respectfully requests reconsideration and allowance in view of the foregoing amendments and following remarks. In the Office Action, mailed November 05, 2003, the Examiner rejected claims 1-10. By this amendment, claims 1, 2, 4-6 and 8-9 have been amended and claim 10 has been canceled. Following entry of these amendments, claims 1-8, and 10 will be pending in the application.

Specification Amendments

Applicant has, for purposes of completeness and readability, amended two paragraphs in the specification by adding the detailed application number, filing date and title of cross-referenced and incorporated copending and commonly-assigned applications. Applicant respectfully requests entry of these specification amendments.

Title Amendment

Applicant has, for purposes of readability, replaced the title of the invention with one the better reflects the claimed subject matter of the invention. Applicant respectfully requests entry of this title amendment.

Drawing Objections

In the Office Action, the Examiner objected to the drawings under 37 C.F.R. §1.84 for allegedly failing to meet the rules for margins. Applicant has created, without substantive amendment, formal drawings on the attached replacement sheets for Figures 1-4 of the application as filed. Therefore, for at least this reason, Applicant respectfully requests withdrawal of the drawing objections.

Claim Objections

In the Office Action, the Examiner objected to claim 9 under 37 C.F.R. §1.75(c) for allegedly being of improper dependent form for failing to further limit the subject matter of a

previous claim. Applicant has amended claim 9 to include subject matter that further limits claim 6, the claim from which amended claim 9 now depends. Therefore, for at least this reason, Applicant respectfully requests withdrawal of the claim 9 objection.

Claim Rejections under 35 U.S.C. § 112 (Second Paragraph)

In the Office Action, the Examiner rejected claim 10 under 35 U.S.C. §112, second paragraph, for allegedly failing to particularly point out and distinctly claim the subject matter that Applicant regards as the invention. Specifically, the Examiner noted that it is unclear how instructions can embody an apparatus. Applicant has amended claim 10 to more clearly define the subject matter of Applicant's invention.

Thus, for at least this reason, Applicant respectfully requests withdrawal of the §112, second paragraph, rejection of claim 10.

Claim Rejections under 35 U.S.C. §102(b)

In the Office Action, the Examiner rejected claims 1, 2 and 4 under 35 U.S.C. §102(b) as allegedly being anticipated by U.S. Patent No. 5,550,965 to Gabbe et al. (hereinafter, "Gabbe"). Applicant has amended claims 1, 2 and 4 to further clarify the invention. Thus, Applicant respectfully traverses the rejections of claims 1, 2 and 4.

An anticipation rejection is proper when a patent applicant has claimed an invention that "was patented ... in this or a foreign country ... more than one year one year prior to the date of the application for patent in the United States." 35 U.S.C. §102(b). A claim is anticipated under 35 U.S.C. §102(b) "only if each and every element *as set forth in the claim* is found, either expressly or inherently described, in a single prior art reference." *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1570 (Fed. Cir. 1988) (emphasis in original), *cert. denied*, 488 U.S. 892 (1988).

For at least the reasons stated below, Applicant asserts that Gabbe fails to expressly or inherently describe each and every element of the invention claimed by Applicant and, therefore, that Applicant's rejected claims 1, 2 and 4 are patentably distinct from Gabbe.

Independent Claim 1

Applicant's independent claim 1, as amended, recites a computer system that includes:

> a first processor;
>
> a second processor; and
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> an instruction memory coupled to the first and second processors having a software direct memory access (DMA) engine stored therein, the software DMA engine, when executed by a processor of the first and second processors, being capable of transferring data directly between all resources in the computer system.

Gabbe neither discloses nor suggests a computer system as recited, having a software DMA engine loaded into an instruction memory that is capable of being executed by either or two processors and is further capable of transferring data directly between all resources in the computer system as required by amended independent claim 1.

In asserting anticipation of the invention as claimed in independent claim 1, the Examiner refers to elements 10, 12 and 13 of Figure 1 Gabbe. Figure 1 of Gabbe illustrates a hardware system that includes a first processor (element 10), a second processor (element 12) and a separate hardware DMA coprocessor (element 13). Gabbe does not disclose or suggest the subject matter of amended independent claim 1 for at least the following reasons.

First, Gabbe nowhere discloses a software DMA engine that is capable of being executed by either of two processors as required by amended independent claim 1. Rather, Gabbe discloses a two processor system where the hardware DMA coprocessor "can transfer data between [resources] without direct involvement of the first processor." (Gabbe, col. 4, ll. 38-42) (emphasis added). Further, Gabbe nowhere discloses the second processor interacting with the hardware DMA coprocessor.

In contrast, Applicant's claimed invention does not contemplate a separate hardware DMA coprocessor. In fact, as stated in Applicant's Abstract, the present invention "eliminates the overhead and limitations associated with conventional hardware DMA engines." Additionally, Applicant's claimed software DMA engine is stored in an instruction memory and is executable by either processor of the multiple processor system.

Second, Gabbe nowhere discloses providing a software DMA engine that is capable of

transferring data between any resources in the computer system as required by amended independent claim 1. Rather, Gabbe discloses (see Figure 1 of Gabbe) a two processor (10, 12) system with two separate and distinct local databuses (38, 48) and a single global databus (42). Both processors of Gabbe can access the global databus (42), but neither can access the others local databus. (see generally, Gabbe, col. 4, ll. 33-65). Likewise, because the Gabbe hardware DMA coprocessor (13) resides on the first processor (10) databus (38), the hardware DMA coprocessor (13) cannot access the second local RAM (50), the second ROM (52) or the second processor (12).

In contrast, Applicant's claimed invention provides for a software DMA engine that is capable of directly transferring data, when executed by one of the processors, between any of the resources of the computer system.

In summary, for at least the reasons presented above, Gabbe neither discloses nor suggests a computer system as recited, having a software DMA engine loaded into an instruction memory that is capable of being executed by either or two processors and is further capable of transferring data directly between all resources in the computer system as required by amended independent claim 1. Accordingly, Applicant respectfully submits that amended independent claim 1 is allowable over the art of record.

Dependent Claim 2 and 4

Amended claims 2 and 4 ultimately depend from amended independent claim 1. The allowability of dependent claims 2 and 4 thus follows from the allowability of amended independent claim 1; as such, dependent claims 2 and 4 are allowable over the art of record.

Further, with regard to amended claim 2, Gabbe nowhere discloses a software DMA engine that, when executed by one of a multiple of processors, is capable of data processing, data filtering, data compacting and data reformatting. Rather, the hardware DMA coprocessor of Gabbe merely performs the typical DMA functions of passing data from one point to another within the computer system without having to first pass the data through a processor. In contrast, since Applicant's software DMA engine is being executed by one of the processors, it can also simultaneously perform more complex tasks on the data being passed between resources.

Thus, for at least these reasons, Applicant respectfully submits that dependent claims 2 and

4 are allowable over the art of record.

Claim Rejections under 35 U.S.C. §103(a)

In the Office Action, the Examiner rejected claims 3 and 5-10 under 35 U.S.C. §103(a) as allegedly being unpatentable over Gabbe in view of U.S. Patent No. 5,884,027 to Garbus et al. (hereinafter "Garbus"). Applicant has amended claims 5, 6 and 8-9 to further clarify the invention and has canceled claim 10. Thus, Applicant respectfully traverses the rejections of claims 3 and 5-10 and notes for subsequent reference the following standards for a proper §103(a) rejection.

A §103(a), or obviousness, rejection is proper only when "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains." 35 U.S.C. §103(a). The Examiner must make out a *prima facie* case for obviousness. The mere fact that references can be combined or modified is not sufficient to establish *prima facie* obviousness. The *en banc* Federal Circuit has held that "structural similarity between claimed and prior art subject matter, proved by combining references or otherwise, where the prior art gives reason or motivation to make the claimed compositions, creates a prima facie case of obviousness." *In re Dillon*, 16 U.S.P.Q. 2d 1897, 1901 (CAFC 1990). The underlying inquiries into the validity of an obviousness rejection are: "(1) the scope and content of the prior art; (2) the level of ordinary skill in the prior art; (3) the differences between the claimed invention and the prior art; and (4) objective evidence of nonobviousness." *In re Dembiczak*, 175 F.3d 994, 998, (Fed. Cir. 1999).

For at least the reasons stated below, Applicant asserts that the combination of Gabbe and Garbus fails to describe or suggest the subject matter as a whole of Applicant's claimed invention and, therefore, that Applicant's rejected claims 3 and 5-10 are patentably distinct from Gabbe in view of Garbus.

Dependent Claims 3 and 5

Dependent claims 3 and 5 ultimately depend from amended independent claim 1. The allowability of dependent claims 3 and 5 thus follows from the allowability of independent claim 1

(as discussed above); as such, dependent claims 3 and 5 are allowable over the art of record.

Independent Claim 6

For the reasons stated below and taking into consideration the standards for obviousness presented above, Applicant asserts that one of ordinary skill in the art would not have considered Applicant's invention obvious at the time of invention and, therefore, that Applicant's rejected independent claim 6, as amended, is not obvious over the prior art of record.

Applicant's independent claim 6, as amended, recites a DMA apparatus, implemented in software on a multi-processor computer system that includes:

> a first instruction memory location in the computer system with a load multiple data instruction loaded therein; and
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> a second instruction memory location in the computer system with a store multiple data instruction loaded therein, wherein
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> the load multiple data instruction, when executed by a processor in the computer system, is capable of loading data from multiple locations in a resource into multiple locations in an internal register in the processor; and
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> the store multiple data instruction, when executed by the processor in the compute system, is capable of storing data from multiple locations in the internal register in the processor into multiple locations in a memory.

The combination Gabbe and Garbus neither discloses nor suggests the DMA implemented in software on a multi-processor computer system, where the DMA instructions are loaded into first and second instruction memory locations in the computer system and executed by a processor to perform the instructions' functions as required by amended independent claim 6. For at least the following reasons, Applicant's claimed invention is patently distinct from the art of record.

Gabbe and Garbus nowhere disclose a software DMA that is capable of being executed by a processor of a multi-processor computer system as required by amended independent claim 6. Rather, Gabbe discloses a two processor system where the hardware DMA coprocessor "can transfer data between [resources] without direct involvement of the first processor." (Gabbe, col. 4, ll. 38-42) (emphasis added). Further, Garbus discloses a "DMA Controller hardware [that] is responsible for executing data transfers." (Garbus, col. 42, ll. 55-56) (emphasis added).

In contrast, Applicant's claimed invention does not contemplate a separate hardware DMA

coprocessor. In fact, as stated in Applicant's Abstract, the present invention "eliminates the overhead and limitations associated with conventional hardware DMA engines." Additionally, Applicant's claimed software DMA engine is stored in an instruction memory and is executable by a processor of the multiple processor system.

In summary, for at least the reasons presented above, the combination Gabbe and Garbus neither discloses nor suggests the DMA implemented in software on a multi-processor computer system, where the DMA instructions are loaded into first and second instruction memory locations in the computer system and executed by a processor to perform the instructions' functions as required by amended independent claim 6.

Thus, Applicant requests the withdrawal and reconsideration of the claim rejection for amended independent claim 6. Applicant respectfully submits that amended independent claim 6 is in a condition for allowance, and respectfully requests a Notice to that effect.

Dependent Claims 7-9

Dependent claims 7-9 ultimately depend from amended independent claim 6. The allowability of dependent claims 7-9 thus follows from the allowability of amended independent claim 6; as such, dependent claims 7-9 are allowable over the art of record.

Further, with regard to amended claim 9, neither Gabbe nor Garbus disclose or suggest a store multiple data instruction and a load multiple data instruction that, when executed by a processor of the multiple processor computer system, are capable of data processing, data filtering, data compacting and data reformatting. Rather, the hardware DMA of both Gabbe and Garbus merely performs the typical DMA functions of passing data from one point to another within the computer system without having to first pass the data through a processor. In contrast, since Applicant's software DMA is being executed by one of the processors, it can also simultaneously perform more complex tasks on the data being passed between resources.

Thus, for at least these reasons, Applicant respectfully submits that dependent claims 7-9 are allowable over the art of record.

Conclusion

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition of allowance and a Notice to that effect is earnestly solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

CHARGE STATEMENT: The Commissioner is hereby authorized to charge fees that may be required relative to this filing, or credit any overpayment, to our Deposit Account 50-2213, Order No. 044204-0308164.

Respectfully submitted,
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